

**ABSTRACT**

The present invention relates to the calibration and alignment of an X-ray reflectometry ("XRR") system for measuring thin films. An 5 aspect of the present invention describes a method for accurately determining  $C_0$  for each sample placement and for finding the incident X-ray intensity corresponding to each pixel of a detector array and thus permitting an amplitude calibration of the reflectometer system. Another aspect of the present invention relates to a method for aligning an angle- 10 resolved X-ray reflectometer that uses a focusing optic, which may preferably be a Johansson crystal. Another aspect of the present invention is to validate the focusing optic. Another aspect of the present invention relates to the alignment of the focusing optic with the X-ray source. Another aspect of the present invention concerns the correction 15 of measurements errors caused by the tilt or slope of the sample. Yet another aspect of the present invention concerns the calibration of the vertical position of the sample.